

3. RECORD-KEEPING REQUIREMENTS

3.1 Industrial Hygiene Monitoring Records

The IH will record airborne monitoring and sampling data (both area and personal) on the INEEL industrial hygiene system. All monitoring and sampling equipment will be maintained and calibrated in accordance with INEEL procedures and the manufacturer specifications. Industrial hygiene airborne monitoring and sampling data will be treated as limited access information and maintained by the IH in accordance with companywide safety and health manual procedures. Any airborne monitoring or sampling done by nonindustrial hygiene and safety personnel will be documented in a project-controlled logbook, which will be reviewed by the IH.

Site personnel or their representatives have a right to both IH monitoring and sampling (both area and personal) data.

3.2 Field Team Leader Logbook and Site Attendance Logbook

Logbooks will be maintained in accordance with MCP-231, "Logbooks." The FTL will keep a record of daily site events in the FTL logbook and will maintain accurate records of all personnel (e.g., workers and nonworkers) who are onsite each day in a site attendance logbook. Logbooks must be obtained from the field data coordinator for the INEEL Sample Management Office (SMO). The completed logbooks must be returned to the SMO within 6 weeks of project completion. The logbooks are then submitted to ER Document Control.

3.3 Environmental Restoration Document Control

The ER document control organizes and maintains data and reports generated by ER field activities. The ER document control maintains a supply of all controlled documents and provides a documented system for the control and release of controlled documents, reports, and records. Copies of the project plans for ER, this HASP, the ER Project Management Plan (PLN-694), the QAPjP, and other project-specific documents are maintained in the project file by ER document control.

Completed sample logbooks are submitted to the sample management office within 6 weeks of project completion. All other project records and logbooks, except IH logbooks, must be forwarded to ARDC within 30 days after completion of field activities.

4. PERSONNEL TRAINING

All work-site personnel will receive training as specified by the OSHA HAZWOPER standard (29 CFR 1910.120 and 1926.65) and the companywide safety and health manuals. Radiation worker training will be conducted in accordance with the *INEEL Radiological Control Manual* (PRD-183) and Program Description Document (PDD) -1073, "Radiological Control Training." Table 1 summarizes training requirements for work-site personnel. Specific training requirements for each worker may vary depending on the hazards associated with their job assignment. Proof of completion of all required training courses (including refresher training) must be accessible at all times.

Before beginning work at the work site, a site-specific project safety orientation will be conducted by the FTL or HSO. The orientation will consist of a complete review of this HASP and attachments with time for discussion and questions. Before orientation, personnel training records must be verified to be current and complete for all required training shown in Table 1. Upon completing the safety orientation, personnel will sign the "Cold Test Pit Health and Safety Plan Training Acknowledgment Form" (see Appendix A) to indicate that they have received the briefing and understand requirements contained in the HASP. For projects lasting longer than 3 days, personnel without previously documented 24-hour field-supervised training will be monitored for at least the initial 3 days of project activities by the job-site supervisor, FTL, or HSO. Upon completion of satisfactory performance the supervisor will complete the "HAZWOPER 24-Hour Supervised Field Experience Acknowledgment Form" (see Appendix B) and have workers sign the form to certify that they have received the training identified on the form. Copies of the documentation will be retained in the field training records for the project. The training records will be forwarded to the INEEL EM training coordinator for retention in the INEEL employee training records database (TRAIN).

Table 1. Required training for site personnel.

Task or Position (Topic)	Field Team Leader, Job Site Supervisor, or Health and Safety Officer (Required)	Field Team (Required)	Nonworkers ^a (Required)	Visitors ^b (Required)
Site-specific training ^c	X	X	X ^d	X ^d
Decontamination (site-specific HASP) ^e	X	X	X	X
Hazard communication ^f	X	X	X	X
Fire extinguisher training ^f	X	X		
Site control and warning devices ^f	X	X	X	X
HASP emergency response plan (see Section 11) ^f	X	X	X	X
40-hour HAZWOPER ^{g, h}	X	X	—	—
8-hour HAZWOPER site supervisor ^h	X	—	—	—
Hearing conservation	X ^d	X ^d	X ^d	X ^d
Confined space	X ^d	X ^d	X ^d	X ^d
DOE radiological worker-II ^{e, h}	X	X	X ^d	—
Cardiopulmonary resuscitation (CPR) and medic first aid ⁱ	X	—	—	—
Respirator qualification and fit test	X ^j	X ^j	—	—
HAZMAT employee general awareness training ^a	X	X	X	—

This training is required only if the personnel is identified as a “HAZMAT” employee (i.e., anyone who directly affects hazardous material transportation safety by handling, packaging, labeling, loading, unloading, moving, or driving [in accordance with 49 CFR 171.8]).

- a. Visitors are required to meet the nonworker training requirements, at a minimum, if they enter the control zone.
- b. Training will be documented using HASP acknowledgment forms (e.g., site-specific training and 24-hour supervised experience).
- c. This training requirement is based on project duties and site zone access requirements, as required.
- d. This training will not be required for entry or work at the cold test pits because no radiation hazards are present and radiation hazards inside the control zone are simulated.
- e. This topic will be included in site-specific training.
- f. This training includes 40 hours of classroom instruction and 24 hours of supervised field experience.
- g. This training will be based on individual requirements for the specific project as determined by the HSO.
- h. Two medic first-aid and CPR-qualified individuals must be present during site activities.
- i. This training is required only if areas requiring respirator use will be entered.

DOE = U.S. Department of Energy

HASP = health and safety plan

HAZMAT = hazardous material

HAZWOPER = hazardous waste operations and emergency response

5. OCCUPATIONAL MEDICAL SURVEILLANCE PROGRAM

Hazardous waste will not be handled as a part of the cold test pit activities. No employee exposures will require medical surveillance with the exception of noise. There will be no additional requirements for the OMP.

5.1 Injuries on the Site

It is INEEL policy that an OMP physician examine all injured personnel under the following conditions:

- If an employee is injured on the job
- If an employee is experiencing signs and symptoms consistent with exposure to a HAZMAT
- If there is reason to believe that an employee has been exposed to toxic substances or physical or radiological agents in excess of allowable limits.

Subcontractors must report to their OMP with notice to the INEEL OMP as requested.

Note: Subcontractor employees will be taken to the closest INEEL medical facility to have an injury stabilized before being transported to the subcontractor's treating physician or medical facility.

In the event of a known or suspected injury or illness because of exposure to a hazardous substance or physical agent, the employee will be transported to the nearest INEEL medical facility for evaluation and treatment as necessary. The project manager, FTL, or assigned designee will be responsible for obtaining as much of the following information as is available to accompany the individual to the medical facility:

- Name, job title, work (site) location, and supervisor's name and telephone number
- Substances and physical agents (known or suspected) and material safety data sheet (MSDS) if available
- Date of employee's first known exposure to the substance or physical agent
- Locations, dates, and results of any airborne exposure monitoring or sampling
- Personal protective equipment in use during this work (e.g., type of respirator and cartridge used)
- Number of days per month PPE has been used
- Anticipated future exposure to the substance or physical agent.

Further medical evaluation will be determined by the examining and treating physician according to the signs and symptoms observed, hazard involved, exposure level, and specific medical surveillance requirements established by the OMP director, in compliance with the OSHA HAZWOPER standard (29 CFR 1910.120 and 1926.65).

As soon as possible after an injured employee has been transported to the INEEL medical facility, the FTL, project manager, or assigned designee will make proper notifications.

6. ACCIDENT PREVENTION PROGRAM

Cold test pit activities present numerous potential physical hazards to personnel conducting the required tasks. It is critical that all personnel understand and follow the task-specific requirements of this HASP. Engineering controls, hazard isolation, specialized work practices, and the use of PPE will be implemented to eliminate or mitigate potential hazards and exposures. However, all personnel on the site must play their role in the identification and control of hazards.

6.1 Voluntary Protection Program

The INEEL safety process embraces the Voluntary Protection Program (VPP) criteria, principles, and concepts. All levels of management are responsible for implementing safety policies and programs and for maintaining a safe and healthy work environment. Project personnel and subcontractors are expected to take a proactive role in preventing accidents; ensuring safe working conditions for themselves and fellow personnel; and complying with all work control documents and approved procedures.

The VPP is a process that promotes and encourages continuous safety improvement, but is not a requirement of any regulatory agency. The INEEL and subcontractors participate in VPP voluntarily for the safety of their employees. The VPP incorporates the following five key elements:

1. Management commitment to safety and health will be demonstrated through their visibility in the workplace and providing the necessary resources.
2. Employee involvement means that employees have an active and meaningful role in contributing to the structure and operation of the safety and health program. This involvement results in ownership of the safety and health program by all employees.
3. Work site analysis includes analysis of new facilities and processes, comprehensive safety and health surveys, routine self-assessments, a reliable system for employees to report hazards, and an accident and incident investigation system and trend analysis.
4. Hazard prevention and control means that written safety rules and safe work practices must be in place to eliminate or control hazards.
5. Safety and health training will be provided to all employees to ensure that they know what their responsibilities are and what will be necessary to protect them from safety and health hazards.

6.1.1 Integrated Safety Management

Integrated safety management will be incorporated into all treatability studies. Environmental restoration uses elements from STD-101, MCP-3562, and MCP-2748, "Hazardous Waste Operations and Emergency Response," to ensure that integrated safety management core functions are incorporated into cold test pit work orders. The implementing method for each integrated safety management core function is listed in Table 2.

6.2 General Safe-Work Practices

The following procedures are mandatory for all INEEL and subcontractor personnel working on the site. All site visitors entering the site area (i.e., SZ and beyond) must follow these procedures. Failure to follow these practices may result in permanent removal from the site and other disciplinary actions.

Table 2. Integrated safety management implementation.

Integrated Safety Management Core Function	Implementing Method
Define scope of work	Work plan and the health and safety plan (HASP).
Analyze the hazards	Integrated work control process (IWCP) hazards-profile-screening checklist (STD-101) by project phase and stage as outlined in the HASP and job safety analysis.
Develop and implement hazard controls	HASP, safety work permit (SWP), technical procedure (TPR), or IWCP hazard mitigation guide.
Perform work within controls	The IWCP work order, prejob briefing, walkdown, management self-assessment, environment, safety, health, and quality assurance (ESH&QA) oversight, interface agreement between the responsible site area director (SAD) and the ER project manager, and operational excellence program.
Provide feedback and continuous improvement	Formal post-job review and end-of-project or treatability study report.

The project manager, FTL or assigned designee and the HSO are responsible for ensuring that the following hazard-control practices are followed at the site:

- Limiting access to authorized INEEL, subcontractor, and visitor personnel only.
- Ensuring that all personnel have the authority to initiate STOP WORK actions and use companywide safety and health manuals and MCP-553, "Stop Work Authority."
- Ensuring that absolutely no eating, drinking, chewing gum or tobacco, smoking, applying cosmetics, or any other practice occurs that increases the probability of hand-to-mouth transfer and ingestion of materials, except in a designated area.
- Being aware of and complying with all safety signs, color codes, and barriers and adhering to MCP-2714, "Safety Signs, Color Codes, and Barriers."
- Being alert for dangerous situations, strong or irritating odors, airborne dust or vapors, and broken containers, and reporting all potentially dangerous situations to the project manager, FTL or assigned designee, or HSO.
- Maintaining appropriate spill kits or other containment and absorbent materials at the work site.
- Preventing releases of HAZMATs including those used at the work site; containing (if possible to do so safely) and reporting any spills to the HSO, FTL, or job-site supervisor (and facility representative where applicable); taking steps to clean up any spills in accordance with the appropriate procedure (e.g., activating the emergency preparedness procedures for the area); and notifying the spill-notification team (at Pager No.6400) when any hazardous spill occurs. (See Section 11 for more details on the spill-response plan for the work site.)

- Being familiar with the physical characteristics of the site including but not limited to the following conditions:
 - Wind direction
 - Accessibility of fellow personnel, equipment, and vehicles
 - Communications at the site and with other nearby facilities
 - Major roads and means of access to and from the site
 - Nearest water sources and fire fighting equipment
 - Warning devices and alarms
 - Capabilities and location of nearest emergency assistance.
- Evaluating tasks when windspeeds reach 25 mph or greater, or gusts of 35 mph or greater, by the HSO, RCT, or IH for potential work stoppage.
- Locating eyewash stations in the staging areas.
- Meeting applicable regulations for electrical equipment, wiring, cables, switches, and current-overload protection and maintaining them in a manner that provides protection for project personnel from shock hazards, injury, and prevents property damage. Providing ground-fault protection whenever outdoor electrical equipment is used also is required.
- Keeping all ignition sources at least 50 ft (15 m) from explosive or flammable environments and using nonsparking, explosion-proof equipment if advised to use such equipment by a safety professional.
- Implementing the “buddy system” when working in the exclusion or controlled access zone (see Section 6.4).
- Complying with MCP-2716, “Personal Protective Equipment,” for personnel wearing contact lenses.

6.2.1 External Chemical Exposure

Bulk chemicals (e.g., mixed or excavated) represent sources for external chemical exposures at the site. Basic protective measures used to reduce external exposure include (1) minimizing time for mixing, (2) maximizing the distance from the source of chemicals, and (3) using adequate ventilation whenever possible. The following are methods to minimize external exposure.

6.2.1.1 *Methods for Maximizing Distance from Chemicals.* Workers will use the following methods for maintaining safe distances from and minimizing exposure to chemicals:

- Using remote operational controls when appropriate
- Working upwind from the source of chemicals
- Using only the amount of chemicals needed.

6.2.1.2 Proper Use of Shielding. Workers will use the following methods to ensure they are shielded from hazardous weather conditions and harmful substances:

- Taking advantage of the site equipment and enclosures (e.g., wind screens and shields)
- Wearing safety glasses, face shield or full-face respirator (depending on the task) to protect eyes from chemical splashes, spills, or vapors.

6.2.2 Internal Chemical Exposure

Chemicals can enter the body through inhalation, ingestion, absorption through wounds, or injection from a puncture wound. The following are methods to minimize internal chemical exposure:

- Wearing respiratory protection required for the task, performing all leak checks, and inspecting all PPE prior to entering contaminated areas
- Reviewing the SWP and the contamination sources and locations and minimizing or avoiding activities in those areas
- Using portable ventilation and filter equipment when working with or mixing dust or chemical particles
- Not touching the face (adjusting glasses or PPE) or other exposed skin with contaminated gloves
- Following all posted instructions and removing PPE as prescribed when exiting contaminated areas and asking the IH or HSO personnel for assistance if questions arise
- Washing hands and face before eating, drinking, smoking, or other activity that may provide a pathway for contaminants.

6.3 Nonradiological Contaminant Exposure Avoidance

The waste in the cold test pits will be a simulated waste containing nonradiological constituents (e.g., organic and inorganic chemicals and hazardous materials). The dominant nonradionuclide contaminants that will be monitored are listed in Table 3. The same potential exposure pathways that exist for radionuclide contamination apply equally to nonradionuclide contaminants. Each contaminant has distinct physical, chemical, and mechanical properties that determine its toxicity. Threshold limit values (TLVs) have been established to provide guidelines in evaluating airborne and skin exposure to these chemicals and materials (ACGIH 1998). They represent levels and conditions under which it is believed that nearly all workers may be exposed day after day without adverse health effects. Based on these TLVs, specific action limits have been established (see Section 8) to further limit the potential for approaching the contaminant TLVs.

Table 3. Monitored cold test pit project nonradiological hazards.^a

Task or Activity	Monitored Nonradiological Hazards
Phase I—Preplanning and activation of pits	Survey of the cold test pit prior to set up at the work site.
Moving onto and setting up equipment at the cold test pit project task site and establishing control zones	
Phase II—Fabrication of test pits for individual projects	Periodic chemical-contamination monitoring of work sites during excavation of vegetation and soil material. Periodic monitoring of truckloads of soil and stockpiles at the cold test pit sites for chemical contamination.
Phase III—Administrative operations and maintenance of cold test pits	Daily survey of the area in and around the cold test pit operating equipment for chemical contamination.
Phase IV—Restoration and pit closure	Survey and monitoring of cold test pit equipment after decontamination for chemical contamination. Survey of areas for residual chemical contamination after equipment is removed and pits are excavated and the area restored.

a. Monitoring and sampling will be conducted, as deemed appropriate by project IH personnel, based on specific tasks and site conditions.

The engineering controls normally employed to eliminate or mitigate airborne radioactivity will serve to control nonradiological airborne contaminants. Every effort will be made to isolate the source of these hazards through engineering controls and containment where feasible. Some of these contaminants pose other exposure hazards from contact and skin absorption and implementing avoidance practices minimize the potential for exposures. Exposure avoidance at the site includes the following methods:

- Ensuring all high-efficiency particulate air (HEPA) filter systems are operating when sources must be opened or handled
- Collecting bags to isolate the source of contamination
- Wearing all required PPE, inspecting all pieces before donning, and taping all seams
- Changing gloves frequently (when soiled) to prevent the spread of contamination
- Changing PPE if it becomes damaged or soiled with source contaminant material (e.g., sludge and waste residue)
- Containerizing samples to avoid handling twice

- Minimizing time in known or suspected contamination areas (e.g., vapors, sludge, and waste residue)
- Washing hands and face before eating, drinking, smoking, or another activity that may provide a pathway for contaminants.

6.4 Buddy System

The buddy system will be used at the work site to ensure that each worker's mental and physical well being is monitored during the course of the day. Work site personnel will be assigned a buddy by the FTL or job-site supervisor to work with and regularly check on during the day. Workers need to be able to see or hear and effectively communicate with their buddy at all times when in the control zone. Everyone should watch for signs and symptoms of illness or injury in their assigned buddy. A buddy must be able to perform the following tasks:

- Providing assistance
- Verifying the integrity of PPE
- Observing their partner for signs and symptoms of heat stress, cold stress, or contaminant exposure
- Notifying other personnel in the control zone if emergency assistance is needed.

7. SITE CONTROL AND SECURITY

The HASP is designed for the construction of pits and set up of tests as well as the typical work performed to maintain the cold test pits. There will be no need of additional site controls or security outside that which is required for any long-term fieldwork at the INEEL. Work zones may be established as training aids to ensure individuals are trained and comfortable in working with technologies that require going inside the SDA.

7.1 Designated Eating and Smoking Areas

Ingestion of hazardous substances is possible when workers do not practice good personal hygiene habits. It is important to thoroughly wash hands, face, and other exposed skin after completion of work and before smoking, eating, drinking, and chewing gum or tobacco. No smoking, chewing, eating, applying lip balm, or drinking will be allowed within the construction area. The designated eating areas for the site personnel will be the project support trailer or the RWMC cafeteria.

Personnel will not be permitted to smoke in the construction area. Personnel will use only approved facility smoking areas located outside the work zones. Personnel will comply with all smoking policies including disposing of smoking materials in the proper receptacles.

7.2 Site Security

Site security will be necessary to ensure the following:

- Preventing exposure of unauthorized, unprotected personnel to identified site hazards
- Avoiding increased hazards of unapproved equipment operations or waste abandonment
- Preventing theft
- Avoiding interference with safe working procedures
- Maintaining cold test pit security during working hours
- Controlling access at the administration trailer
- Ensuring that all personnel have an INEEL access badge and sign the cold test pit visitor's log or project log
- Ensuring that the FTL and job-site supervisor are responsible for enforcing entry and exit requirements
- Ensuring that physical rope barriers are used on road access to the cold test pit
- Ensuring that individual control zones are posted around perimeters with signs establishing entry requirements
- Ensuring that visitors to the cold test pit have approval of the project manager and a trained escort.

The following security actions are required to maintain cold test pit security during off-duty hours:

- Patrolling the area periodically during back shifts by the site security subcontractor
- Placing access rope barriers across the road upon leaving the cold test pit at the end of the shift
- Ensuring that all equipment is properly secured.

8. HAZARD EVALUATION

8.1 Hazard Assessment

This HASP is site specific and follows MCP-255, “Hazardous Waste Operations and Emergency Response Activity Health and Safety Plans.” In addition, each stage and phase of cold test pit activities has been analyzed for hazards based on the hazard-profile-screening checklist from the IWCP. The core principles of the integrated safety management system (ISMS) are incorporated into this HASP and the work plans for individual treatability studies.

Personnel who work at the cold test pits may be exposed to industrial hazards or chemical and physical agents. Radiological materials are simulated with rare earth tracers or sealed sources. No radiological contaminants are located at the cold test pits. The degree of hazards posed to onsite personnel entering the cold test pit will be low and typical for hazards associated with light construction and maintenance activities. Each task with its associated hazards is summarized in Table 4. The MSDSs for all hazardous materials used will be maintained at the job site.

Table 4. Cold test pit activities and associated hazards.

Phase	Associated Hazards or Hazardous Agent
Preplanning and activation of cold test pits	Physical hazards associated with working outdoors include lifting, walking, and working surfaces, setup of barriers and control zones, equipment inspection, activation of utilities (e.g., water and power), material handling, and equipment transportation and setup.
Fabrication and assembly of cold test pits for individual projects	<ul style="list-style-type: none">• Physical hazards associated with construction and excavation• Mobile crane operations (i.e., hoisting and rigging)• Heavy equipment movement and vehicle traffic• Chemical hazards associated with mixing and packaging test materials.
Administrative operations and maintenance of the cold test pits	Physical hazards from equipment operation, minor maintenance and repair work, and restock of materials.

The overall objectives of this hazards assessment section are to provide guidance on the following tasks:

- Evaluating cold test pit waste or contaminant generation during construction activities to ensure that exposure to chemical agents remains below the exposure potential for cold test pit project personnel by all routes of entry
- Evaluating all cold test pit project tasks to determine the extent that existing chemical and physical hazards may potentially impact the safety of site personnel
- Establishing the necessary monitoring and sampling required to continuously evaluate exposure and contamination levels, determining adequate ALs to mitigate potential exposures, and providing specific actions to be followed if ALs are reached

- Determining engineering controls, isolation methods for contamination, work practices to limit personnel exposure, administrative controls, and appropriate respiratory protection and protective clothing to protect site personnel from hazards.

8.1.1 Industrial Hygiene Exposure Assessments

The IH will perform an exposure assessment prior to mobilization at a given task site to prevent or mitigate potential personnel exposure to associated hazards. Action levels have been established for contaminants evaluated and determined to present a moderate to high exposure potential. The action levels (ALs) established by the IH as a result of this assessment will be used.

8.1.2 Biological Hazards

Most work will be performed near the RWMC facility fences; therefore, the exposure to biological hazards (e.g., insects, rodents, and reptiles) will be minimal. If employees have concerns from exposure to insect, rodent, or reptile hazards, they should consult with the IH or HSO.

8.1.3 Chemical Hazards

Based on monitoring of cold test pit activities, worker exposure, release to the environment, and contamination of clean soils in the immediate area of the project will be controlled through the following actions:

- Reducing and controlling dust and airborne chemical contamination through wetting as directed by the HSO or IH
- Locating the support zone and ground personnel in a noncontaminated area away from the sampling area or task site as determined by the HSO and IH
- Ensuring that project work conditions will be evaluated by the HSO, IH, and job-site supervisor to determine whether work should continue when winds exceed 25 mph, or gusts to 35 mph or greater.

8.2 Cold Test Pit Site Activities

Personnel may be exposed to industrial, chemical, and physical hazards while working at the cold test pit sites. Engineering controls will be implemented whenever possible, along with adequate work practices, real-time monitoring of contaminants, and site-specific hazard training to further mitigate potential exposures and hazards.

The dominant chemical compounds that are likely to be encountered during cold test pit project tasks are listed in Table 5. The contamination levels represent the highest levels expected during work activities.

An evaluation is presented in Table 6 of these nonradiological contaminants relative to potential routes of exposure and symptoms of overexposure. The main exposure route for contaminants will be from respirable airborne dusts during soil excavation and separation activities. Engineering and administrative controls, worker personal protective clothing strategies, personnel monitoring, and restricted access to control zones will reduce potential contamination. Most of the nonradiological contaminants listed were selected for use because they have high exposure limits and low potential for exposure to workers.

Table 5. Potential dominant chemical compounds at Cold Test Pit South.

Chemical	Amount
Portland cement	3,500 lb
Calcium silicate	472 lb
Sodium nitrate	13,000 lb
Potassium nitrate	14,100 lb
Sodium chloride	700 lb
Sodium sulfate	1,240 lb
Sodium hypophosphate	500 lb
Calcium carbonate	260 lb
Calcium hydroxide	350 lb

The cold test pit site activities do not involve radiological hazards. Cold test pit areas are free of radiological contamination. The SDA has known radiological hazards that are not expected to impact work at the cold test pit areas. Accidental release of radiological contamination during SDA work could present an exposure hazard to cold test pit workers. An event of this type is covered in Section 11. Radiological work permits, protective equipment, and dosimetry are not required for cold test pit activities. Industrial hygiene monitoring is outlined in Section 8.4.1.

8.3 Routes of Exposure

Exposure pathways for HAZMATs are directly related to the nature of cold test pit project tasks, principally the mixing of chemicals used for simulated waste forms and the placement and excavation of materials from the cold test pit soils. Engineering controls, training, and work controls will mitigate potential contact and chemical exposure to these materials. Cold test pit activities do not present a significant potential for exposure to workers, but cold test pit activities can expose workers in the following ways:

- Inhalation of chemical compounds and fugitive dusts during intrusive activities and examination tasks. This contamination may be in vapor, dust, or mist form, resulting in potential lung deposition.
- Ingestion of organic and inorganic compounds adsorbed to dust particles or waste residues, resulting in uptake of contaminants through the gastrointestinal tract causing irritation, internal tissue damage, and deposition to target organs.

8.4 Environmental and Personnel Monitoring

Personnel may be exposed to chemical or physical agents while working at the cold test pit sites. These hazards may be monitored to obtain exposure data and evaluate controls to ensure the health and safety of workers. For the specific hazards that will be monitored during cold test pit tasks, see Table 3. This subsection specifies monitoring and control practices related to personnel and the environment hazards.

Table 6. Evaluation of nonradiological contaminants at the cold test pit work sites.

Chemical Exposure	Exposure Limit	Routes of Exposure ^a	Instrumentation Used for Monitoring	Target Organs or System	Carcinogen?	Exposure Potential (all routes relative to personal protective equipment)
Sodium nitrate	3 mg/m ³ respirable dust	Inhalation, ingestion, and contact hazard	Personal sampling pump with cyclone and filter.	Local irritant	No	Low
Sodium sulfate	3 mg/m ³ respirable dust	Inhalation, ingestion, and contact hazard	Personal sampling pump with cyclone and filter.	Local irritant	No	Low
Sodium chloride	3 mg/m ³ respirable dust	Inhalation and ingestion	Personal sampling pump with cyclone and filter.	Local irritant	No	Low
Sodium hypophosphate	3 mg/m ³ respirable dust	Inhalation, ingestion, and contact hazard	Personal sampling pump with cyclone and filter.	Local irritant	No	Low
Calcium carbonate	10 mg/m ³ respirable dust	Inhalation and ingestion	Personal sampling pump with cyclone and filter.	Local irritant: kidneys and central nervous system.	No	Low
Calcium hydroxide	5 mg/m ³ respirable dust	Inhalation, ingestion, and contact hazard	Personal sampling pump with cyclone and filter.	Local irritant	No	Low
Calcium silicate	10 mg/m ³ respirable dust	Inhalation, ingestion, and contact hazard	Personal sampling pump with cyclone and filter.	Local irritant	No	Low
Potassium nitrate	3 mg/m ³ respirable dust	Inhalation, ingestion, and contact hazard	Personal sampling pump with cyclone and filter.	Local irritant: kidneys and blood.	No	Low

Table 6. (continued).

Chemical Exposure	Exposure Limit	Routes of Exposure ^a	Instrumentation Used for Monitoring	Target Organs or System	Carcinogen?	Exposure Potential (all routes relative to personal protective equipment)
Portland cement	10 mg/m ³ respirable dust	Inhalation, ingestion, and contact hazard	Personal sampling pump with cyclone and filter.	Local irritant	No	Low
Crystalline silica —quartz (from native soils)	0.1 mg/m ³ respirable dust	Inhalation	Personal sampling pump with cyclone and filter.	Lung	Yes	Low

Monitoring requirements for physical hazards are specified in Section 8.5. If a hazard has been discovered that is not included in Table 3, then the HSO, IH, and safety engineer will ensure that the hazard is properly mitigated.

The potential for exposure to nonradiological hazards will be present at a relatively low level during many of the tasks that will take place at the cold test pit sites and only affects personnel who work directly with chemicals in the exclusion zone. Use of operating procedures, engineering and administrative controls, worker training, and protective equipment will mitigate these hazards. Monitoring with direct reading instruments will be conducted to provide IH personnel with real-time data to assess the effectiveness of these controls.

The greatest exposure potential from cold test pit activities will be the inhalation of chemicals. The IH and HSO will focus on these activities and monitor with direct reading instrumentation and full- and partial-period air sampling in accordance with the applicable technical procedures as deemed appropriate. Other workers and areas of the site also will be monitored to determine the level of chemical exposure to workers. Noise and other physical hazards will be monitored and controlled, as outlined in Section 8.5. Specific hazardous-agent exposures that will be monitored are listed on Table 7.

8.4.1 Industrial Hygiene Monitoring

Sampling for exposure to airborne chemicals and dust will be performed in accordance with NIOSH, OSHA, EPA, or other established methods, and the INEEL Safety and Health Manuals. The IH will maintain and calibrate all equipment used.

All full- and partial-period airborne contaminant sampling will be conducted using applicable NIOSH or OSHA methods and in conformance to the INEEL Safety and Health Manuals. Risk assessments for site personnel will be conducted in accordance with MCP-153, "Industrial Hygiene Exposure Assessment."

Table 7. Action levels and associated responses for cold test pit project hazards.

Contaminant or Agent Monitored	Action Level	Response Taken If Action Level Is Exceeded
Dust	> 5 mg/m ³	Continue working, increase dust control, and monitor with sample pump with appropriate media.
Respirable dust	> 1.5 mg/m ³	Continue working, increase dust control, and monitor with sample pump with appropriate media.
Noise	8-hour TWA > 85 dBA	Wear hearing protection, continue working, and monitor with sound-level meter or noise dosimeter.
	10-hour TWA > 83 dBA	Wear hearing protection, continue working, and monitor with sound-level meter or noise dosimeter.
Heat stress	Temperatures > 90°F or use of full anti-contamination protective clothing	Implement MCP-2704, "Heat and Cold Stress," and appropriate work and rest schedule; monitor with heat stress monitor (wet-bulb globe temperature [WBGT]).
TWA = time-weighted average		
dBA = decibel A-weighted		

8.5 Physical Hazards Evaluation, Control, and Monitoring

This section describes the physical hazards present at the work site and the methods that will be used to monitor and control them. It will be critical that all personnel are aware and understand the nature of the tasks that will be conducted, the equipment to be used, and the controls in place to eliminate or mitigate potential safety hazards.

8.5.1 Temperature Extremes

The cold test pit project activities will be conducted during months where there will be a potential that either heat- or cold-stress factors could affect task-site personnel because of ambient air temperatures and layered PPE.

8.5.1.1 Heat Stress. The FTL or job-site supervisor, in consultation with the HSO, IH, or safety engineer, will determine whether heat stress will become a concern and will follow MCP-2704.

Outside temperatures are expected to be variable during cold test pit project activities and personnel may be required to wear protective clothing that prevents the body from cooling. High ambient air temperatures can result in increased body temperature, heat fatigue, heat exhaustion, or heat stroke that can lead to symptoms ranging from physical discomfort to unconsciousness and death. Employees will inform the FTL or HSO when they experience any of the signs or symptoms of heat stress or observe that a fellow employee or “buddy” is experiencing these signs or symptoms. These hazards are discussed in MCP-2704.

Individuals showing any of the symptoms listed above will stop work, move to a shaded area to rest, be provided cool drinking water, and be monitored by a medic-, CPR-, or first-aid certified employee. If employees exhibiting signs or symptoms of heat stress do not show signs of immediate recovery when removed to the rest area, they will be transported to the nearest medical facility for medical attention.

Monitoring for heat stress conditions will be performed in accordance with the MCP-2704. Depending on the ambient weather conditions, work conditions, type of PPE worn, and the physical response of personnel, the IH or RCT will inform the FTL of necessary adjustments to the work and rest cycle. Additionally, physiological monitoring may be conducted to determine whether personnel are replenishing liquids fast enough. A supply of cool drinking water will be provided in designated eating areas and consumed only in these areas. Workers may periodically be interviewed by the IH, or HSO to ensure that the controls are effective and that excessive heat exposure is not occurring. Workers will be encouraged to monitor their body signs and to take breaks if symptoms of heat stress occur. The signs of heat stress are listed on Table 8.

8.5.1.2 Cold Stress. Exposure to low temperatures may be a factor during times of cold test pit activities. Relatively cool ambient temperatures and wet or windy conditions increase the potential for cold injury to personnel. The project IH and HSO will be responsible for obtaining meteorological information to determine whether additional cold stress administrative controls are required. Project personnel will also be cautioned regarding cold-stress factors associated with rapid cooling once impermeable PPE layers are removed, causing the potential for freezing of accumulated moisture on PPE outer and inner surfaces under extremely cold conditions.

The MCP-2704 discusses the hazards of cold stress. Cold stress conditions will be monitored in accordance with the companywide safety and health manuals. The requirements in Table 9 will be followed for the outer layer of protection, based on nonradiological hazards.

Table 8. Heat stress signs and symptoms.

Heat-Related Illness	Signs and Symptoms	Emergency Care
Heat rash	Red skin rash and reduced sweating.	Keep the skin clean, change all clothing daily, and cover affected areas with powder containing cornstarch or with plain cornstarch.
Heat cramps	Severe muscle cramps, exhaustion, sometimes with dizziness or periods of faintness.	Move the patient to a nearby cool place, and give the patient half-strength electrolytic fluids; if cramps persist, or if more serious signs develop, seek medical attention.
Heat exhaustion	Rapid, shallow breathing; weak pulse; cold, clammy skin; heavy perspiration; total body weakness; dizziness that sometimes leads to unconsciousness.	Move the patient to a nearby cool place, keep the patient at rest, give the patient half-strength electrolytic fluids, treat for shock, and seek medical attention. DO NOT TRY TO ADMINISTER FLUIDS TO AN UNCONSCIOUS PATIENT.
Heat stroke	Deep, then shallow breathing; rapid, strong pulse, then rapid, weak pulse; dry, hot skin; dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching.	Cool the patient rapidly. Treat for shock. If cold packs or ice bags are available, wrap them and place one bag or pack under each armpit, behind each knee, one in the groin, one on each wrist and ankle, and one on each side of the neck. Seek medical attention as rapidly as possible. Monitor the patient's vital signs constantly.
DO NOT ADMINISTER FLUIDS OF ANY KIND.		

Table 9. Cold test pit project task-based personal protective equipment requirements and modifications.

Task	Personal Protective Equipment Level	Requirements and Modifications
Activation and mobilization	Level D	All mobilization tasks will be conducted in Level D PPE with some modification for hand and head protection as warranted.
	Modified Level D	Site preparation for the cold test pit: grading and leveling of the area, setup of the cold test pit equipment, and mixing of test chemicals.
Construction of test pits	Level D	All tasks will be conducted in Level D PPE with some modification for hand and head protection as warranted.
Operation and maintenance	Level D	All support tasks will be conducted in Level D PPE with some modification for hand and head protection as warranted.
Restoration and closure	Level D	All restoration tasks will be conducted in Level D PPE with some modification for hand and head protection as warranted.

The following are provided as general measures for inner clothing layers to prevent cold stress:

- Workers should wear layered warm clothing (e.g., heavy socks and hooded garments) when the air temperature will be below 40°F (4°C). When the air temperature will be below 30°F (-1°C), clothing for warmth will be worn in addition to chemical protective clothing, depending upon worker comfort. Warm clothing may include the following:
 - Insulated suits (e.g., whole-body thermal underwear)
 - Wool or polypropylene socks to keep moisture off the feet if there will be a potential for work activity that could cause sweating
 - Insulated glove liners and gloves with reflective surfaces that reflect body heat back to the hand should be used when air temperatures are extremely low (i.e., less than 5°F [-15°C])
 - Insulated boots and head cover (e.g., hard hat liners).
- At air temperatures below 30°F (-1.1°C), the following work practices will be followed:
 - Outer layers of clothing must be impermeable to water if the worker's clothing will become wet on a job site
 - Workers must change into dry clothing immediately if underclothing becomes wet; however, if the clothing becomes wet from sweating, the workers may finish the task that caused the sweating before changing into dry clothing
 - Workers will be provided a warm area (65°F [18.3°C] or above) to change from work clothing into street clothing
 - Workers will be provided a warm break area (60°F [15.6°C] or above)
 - Space heaters may be provided in the work area if appropriate
 - Hot liquids such as soups or sweet drinks will be provided in the break area, but the intake of caffeine will be limited because of diuretic and circulatory system effects
 - The buddy system will be practiced at all times, and any personnel observed with severe shivering will leave the cold area immediately
 - Workers should layer their clothing (i.e., thinner, lighter clothing should be layered under heavier clothing)
 - Workers handling liquids that evaporate easily (e.g., gasoline or diesel fuel) will take special precautions to avoid soaking clothing or gloves with the liquids because of the added danger of cold injury because of evaporative cooling
 - Work will be planned to minimize the need for workers to sit or stand still for long periods of time.

Additional cold weather hazards exist from working on snow- or ice-covered surfaces. Slip, fall, and material-handling hazards are increased under these conditions. Every effort must be made to ensure walking surfaces are kept clear of ice. The project manager, FTL or assigned designee, or HSO should be notified immediately if slip or fall hazards are noted at the cold test pit sites.

8.5.1.3 Noise. Excessive noise (noise levels greater than 85 dBA for 8 hours) may be present on the project because heavy equipment, portable generators, and power tools are used. The assigned IH will perform noise monitoring based on the MCP-2719, “Controlling and Monitoring Exposure to Noise,” to determine whether personnel assigned to the project are exposed to levels of noise greater than 85 dBA in an 8-hour time-weighted average (TWA) or 83 dBA for a 10-hour TWA. Personnel working at the task site may be exposed to noise levels that exceed 85 dBA for an 8-hour TWA and 83 dBA for a 10-hour TWA. The effects of high sound levels (noise) may include the following:

- Personnel being startled, distracted, or fatigued
- Physical damage to the ear, pain, and temporary or permanent hearing loss
- Interference with communication that would warn of danger.

If the IH determines that personnel are exposed to noise levels greater than or equal to those stated, then those personnel must be enrolled in the hearing conservation program.

Noise measurements will be performed by the IH in accordance with MCP-2719 to determine whether personnel assigned to the jobs identified are above allowable-noise-exposure levels. A TLV of 85 dBA will be applied to personnel exposed to noise levels over no more than an 8-hour day. This level is based on a 16-hour recovery period in a low-noise environment. If personnel are required to work longer than 8 hours in a hazardous noise environment, then the TLV will be adjusted to a lower value. The project IH must be consulted regarding modifications to the 85 dBA for an 8-hour TWA and 83 dBA for a 10-hour TWA value.

Personnel working on jobs that have noise exposures greater than 85 dBA for an 8-hour TWA or 83 dBA for a 10-hour TWA will be required to wear hearing protection until noise levels have been evaluated, and will continue to wear the hearing protection specified by the IH until directed otherwise.

8.5.2 Fire, Explosion, and Material Handling

Combustible or ignitable material in contact with or near exhaust manifolds, catalytic converters, or other ignition sources could result in a fire. The project fire protection engineer will identify these sources as equipment is brought on the site. The accumulation of combustible material will be strictly controlled at the cold test pit sites. Trash and weeds will be controlled at the job site to maintain a 30-ft (9-m) defoliated zone around equipment and structures. Disposal of combustible materials will be assessed at the end of each shift. Class A combustibles (e.g., trash, cardboard, rags, wood, and plastic) will be properly disposed of in metal receptacles in the SZ and in appropriate waste containers within the contamination reduction corridor, contamination reduction zone, and exclusion zone. Class ABC dry chemical fire extinguishers will be located in accordance with requirements listed in Table 10.

Diesel fuel that will be used at the task site for generators and decontamination equipment (e.g., steam cleaner, if required for cold test) will be safely stored, handled, and used. Only flammable liquid containers approved by Underwriters Laboratories and labeled with the contents will be used to store fuel. All fuel containers will be stored at least 15 m (50 ft) from any facilities and ignition sources or stored inside an approved flammable storage cabinet. Additional requirements are provided in MCP-584,

Table 10. Emergency response equipment to be maintained at the work site.

Equipment Name and Quantity Required ^a	Location at Work Site	Responsible Person	Frequency of Inspection
Fire extinguishers	Two Class ABC extinguishers: one in each control zone and field trailer or support vehicle.	Health and safety officer	Monthly
First-aid kit	Support trailer	Industrial hygienist	Monthly
Eyewash station and safety shower	Control zone	Health and safety officer	Weekly
Hazardous materials spill kit ^b	Support trailer	Health and safety officer	Weekly
Extra personal protective equipment (PPE)	Support trailer or vehicle	Health and safety officer	Daily

a. The equipment shown is required if associated hazards are present at the task site as determined by the industrial hygienist.

b. The spill kit consists of shovels, drum, absorbent materials (e.g., pillows and pigs), and plastic bags.

“Flammable and Combustible Liquid Storage and Handling.” Portable motorized equipment (e.g., generators and light plants) will be shut off and allowed to cool down in accordance with manufacturer operating instructions, prior to refueling, to minimize the potential for a fuel fire. Only qualified fuel-handling personnel will conduct fueling tasks.

8.5.3 Biological Hazards

The cold test pits are located in an area that provides habitat for rodents, insects, and reptiles. Based on biological studies done at the INEEL, deer mice have been known to carry Hantavirus. The virus can be present in the nesting and fecal matter of deer mice. A potential exists for project personnel to disturb nests or fecal matter during the course of mobilization and intrusive activities. If such materials are disturbed, they can become airborne and create a potential inhalation pathway for the virus. Also, contact with and improper removal of these materials may provide additional inhalation exposure risks.

If suspect rodent nesting or excrement material is encountered, the FLT, IH, and HSO will be notified immediately and no attempt will be made to remove the matter or clean the area. Following an evaluation of the area, an SWP will be written for disinfecting and removing the matter from the project task area.

Snakes, spiders, and insects (e.g., ticks and mosquitoes) also may be encountered at the cold test pit sites. Common areas to avoid include material stacking and staging areas, under existing structures (e.g., trailers and buildings), under boxes, and other areas that provide shelter for snakes. Protective clothing will prevent insects from direct contact with personnel; however, repellent may be required during Level D activities. Areas where standing water has accumulated provide breeding grounds for mosquitoes and should be avoided.

8.5.4 Confined Spaces

Confined-space hazards exist at the cold test pits any time an excavation greater than 4 ft (1.2 m) deep is performed. Industrial hygiene evaluation and entry authorization (on a confined-space entry permit), in accordance with MCP-2749, “Confined Spaces,” will be completed prior to entry.

8.5.5 Safety Hazards

Industrial safety hazards pose a significant if not the most likely threat to personnel that will be encountered while performing tasks at the cold test pit sites. Section 6 provides general safe-work practices that must be followed at all times. The following sections describe specific industrial safety hazards and procedures to be followed to eliminate or minimize potential hazards to project personnel.

8.5.5.1 Excavation. Heavy equipment will be used to excavate test pits.

8.5.5.2 Handling Heavy Objects. Heavy equipment operations on the project (i.e., handling and maneuvering of drilling cases, bits, full-core sections, and various other pieces of equipment) can result in employee injury. Manual material handling will be minimized through task design and use of mechanical or hydraulic lifts whenever possible.

8.5.5.3 Powered Equipment and Tools. All power equipment and tools will be properly maintained and used by qualified individuals in accordance with the manufacturer’s specifications. For all work performed with powered equipment including powered steam cleaners, PRD-5101, “Portable Equipment and Handheld Power Tools,” will be followed.

8.5.5.4 Heavy Equipment and Moving Machinery. The hazards associated with the operation of heavy equipment include injury to personnel and equipment and property damage. All heavy equipment will be operated properly and in accordance with manufacturer’s instructions. Only authorized personnel will be allowed in the vicinity of operating heavy equipment and should maintain visual communication with the operator. Work-site personnel will comply with MCP-2745, “Heavy Industrial Vehicles”; MCP-2743, “Motor Vehicle Safety”; and PRD-2021, “Powered Industrial Trucks.”

Site personnel working around or near heavy equipment and other moving machinery will comply with the appropriate MCPs and DOE-STD-1090-99, “Hoisting and Rigging.” Additional safe practices will include the following:

- Ensuring that all heavy equipment have functioning backup alarms
- Prohibiting walking directly in back of or to the side of heavy equipment without the operator’s knowledge and taking all necessary precautions prior to moving heavy equipment
- Ensuring that the equipment operator maintains communication, while operating heavy equipment in the work area, with a designated person responsible for providing direct voice contact or approved standard hand signals, and ensuring all site personnel in the immediate work area are made aware of the equipment operations
- Keeping all equipment out of traffic lanes and access ways and storing all equipment to avoid endangering personnel at all times.

8.5.5.5 Electrical Hazards and Energized Systems. Electrical equipment and tools as well as underground lines may pose shock or electrocution hazards to personnel. Safety-related work practices

will be employed to prevent electric shock or other injuries resulting from direct or indirect electrical contact. If work on energized systems is necessary, these practices will conform to the requirements in MCP-2731, "Electrical Safety"; PRD-5051, "Chapter IX-Lockout and Tagout"; facility supplemental MCPs; and Parts I through III of National Fire Protection Association (NFPA) Standard 70E (NFPA 2000). In addition, all electrical work will be reviewed and completed under the appropriate work controls (i.e., HASP, SWPs, and work orders).

Before beginning any subsurface penetrations, underground utility clearances will be obtained by contacting telecommunications (526-1688 or 526-2512). Subsurface investigation clearance will be obtained in accordance with MCP-6205, "Subsurface Investigations." The requirements for advanced 48-hour notice will be met.

8.5.5.6 Personal Protective Equipment. Wearing PPE may reduce a worker's ability to move freely, see clearly, and hear directions and noise that might indicate a hazard. Also, PPE may increase the risk of heat stress. Work activities at the task site will be modified as necessary to ensure that personnel are able to work safely in the required PPE. Work-site personnel will comply with MCP-2716 and MCP-432, "Radiological Personal Protective Equipment." The cold test pit project PPE levels for each task are described in Section 9 and listed in Table 9.

8.5.6 Inclement Weather Conditions

Severe thunder and lightning storms within 5 miles of the cold test pits will require the HSO or FTL to suspend outdoor work. Winds at sustained speeds of 25 mph or greater or gusting to 35 mph will also cause a shut down of operations.

8.6 Other Site Hazards

Site personnel should continually look for potential hazards and immediately inform the safety engineer or HSO of the hazards so that action can be taken to correct the condition.

The FTL and HSO will conduct daily inspections of the task site to ensure that barriers and signs are being maintained, unsafe conditions are corrected, and debris are not accumulating on the site. These inspections will be noted in the FTL logbook. Health and safety professionals present at the task site may, at any time, recommend changes in work habits to the FTL. However, all changes that may affect the cold test pit project written work control documents (i.e., HASP and SWPs) must have concurrence from the appropriate project technical discipline representative onsite and have a document action request prepared, as required.

Personnel working at the task site are responsible to use safe-work techniques, report unsafe working conditions, and exercise good personal hygiene and housekeeping habits throughout the course of their jobs.